

REMARKS

Claims 1-23 are pending in the application. These claims and specification sections were rejected/objected to as follows:

Claims / Section	35 U.S.C. Sec.	References / Notes
Drawings	Objection	<ul style="list-style-type: none">Fig. 3 labeled as "prior art"
1-3, 8-19 & 23	§102(b) Anticipation	<ul style="list-style-type: none">Page (U.S. Patent No. 5,157,461).
1, 3, 4, 11, 13-17, 19, 20 & 23	§102(b) Anticipation	<ul style="list-style-type: none">Liu, et al. (U.S. Patent No. 5,854,678).
5-7, 21 & 22	§103(a) Obviousness	<ul style="list-style-type: none">Page (U.S. Patent No. 5,157,461).

- 5 Applicant has amended claims 1, 8, 11 by adding the limitations of claims 2 and 7 (or equivalent) and 17 (language added for consistency), and has also provided discussion for distinguishing the present invention, with claims as amended, from the art cited against it.

DRAWING OBJECTIONS

- 10 1. *Applicant has amended drawing Figure 3 and labeled it as prior art, pursuant to the Examiner's suggestion.*

Applicants have complied with the Examiner's request and labeled Figure 3 as prior art. Withdrawal of the objection to the drawings is respectfully requested.

35 U.S.C. §102(b), CLAIMS 1-3, 8-19 & 23 ANTICIPATION BY PAGE

2. Page fails to teach or suggest the element of claim 1, as amended, that the thermal and mechanical influences on the optical path lengths of each one of the optical fiber sections are substantially the same.

5 In the OA, on page 2, the Examiner indicates that Page teaches the loop and depolarizers with splices according to the present invention.

Applicants respectfully contend that Page does not teach that the thermal and mechanical influences on the optical path lengths of each one of the optical fiber sections are substantially the same, particularly in light of the amendments
10 to claims 1, 8 and 11.

The Specification, on p. 8 in the last full paragraph highlights the significance of this portion of claim 1. It states, in relevant parts:

15 Great care is often taken to wind loop 10 such that antipodal points on the loop are located proximate each other. In this way, any temperature variations experienced by a portion of the loop result in thermal expansions and/or contractions which tend to cancel each other out. With depolarizers 40 in the loop,
20 however, there will be points along SM loop 10 which are adjacent to PM fibers 40(a) and 40(b). As SM fiber and PM fiber have very different structures in terms of core dimensions, cladding, buffers, etc. the two adjacent sections of fibers will generally react differently to thermal stress. That is, one type of fiber
25 will generally expand or contract relative to the other fiber, resulting in a small but significant difference in the path lengths between counter-rotating light beams.

On pp. 12-13, in the carryover paragraph, the Specification states:

30 The present invention achieves optical symmetry with respect to the loop including depolarizer region 420

5 and fiber loop 10. Thus, a preferred embodiment of the present invention utilizes the same type of fiber for segments 430 and 440. Similarly, short fiber sections 454 and 456 are preferably manufactured using the same type of fiber. More particularly, fiber segments 430 and 440 comprise PM fiber, and fiber sections 454 and 456 preferably comprise PM fiber. As a result, when the loop 10 and depolarizer region 420 are formed into a tight coiled assembly, the resulting system will be thermally symmetrical, such that any point within loop 10 or depolarizer region 420, when carefully wound, will be adjacent to the opposite point within loop 10 or depolarizer 420 which, due to this configuration, will comprise the same type of fiber. In this way, the effects of mechanical strain arising from thermal excursions can be eliminated or reduced.

Claims 1, 8, and 11 have been amended so that the depolarizer region comprises two segments, each having two sections: a longer section and a shorter one. The first segment connected to the first end of the fiber optic loop connects to the longer section of the first segment, and the second segment connected to the second end of the fiber optic loop connects to the shorter section of the second segment.

Page fails to teach that the thermal and mechanical influences on the optical path lengths of each one of the optical fiber sections are substantially the same, and for this reason, fails to anticipate claim 1 of the present invention.

3. Page fails to teach the element of claim 8, as amended, that the two depolarizer segments are of substantially equal length.

In the OA, on page 5, in the last two paragraphs (under the §103 rejection), the Examiner acknowledges that Page fails to teach a specific length for the depolarizers, but that it would have been obvious to one of ordinary skill in

the art at the time the invention was made to make the depolarizers of any length as to reduce the signal fading at the detector.

Applicants do not disagree with the Examiner that Page fails to teach a specific length for the depolarizers, but respectfully disagree that making these
5 sections substantially the same length would be obvious to one of ordinary skill in the art, particularly given the statement that the depolarizers may be made of any length as to reduce signal fading at the detector.

As noted by the Examiner on the bottom of page 2, Page utilizes Loyt depolarizers (454). Loyt depolarizers consist of two segments of single mode
10 fiber where one is twice the length of the second. According to the present invention, the depolarizers are designed such that the sum of polarization maintaining fiber on opposite sides of the sensing loop are of substantially the same length while maintaining an optical design such that the polarization errors are minimized. An arbitrary length of depolarizers and gamma trimming will not
15 achieve both of these objectives simultaneously.

4. Page fails to teach the element of claim 11, as amended, that the two depolarizer segments are configured to maintain mechanical and/or thermal symmetry and suppress polarization errors.

Applicants rely on the arguments presented under numbered paragraph 2
20 above in asserting that Page does not teach the element of claim 11 that the depolarizer segments are configured to maintain mechanical and/or thermal symmetry and suppress polarization errors.

35 U.S.C. §102(b), CLAIMS 1, 3, 4, 11, 13-17, 19, 20 AND 23 ANTICIPATION BY LIU

5 *5. Liu similarly fails to teach or suggest the element of claim 1, as amended, that the thermal and mechanical influences on the optical path lengths of each one of the optical fiber sections are substantially the same, or that the two depolarizer segments are configured to maintain mechanical and/or thermal symmetry and suppress polarization errors.*

On page 4 of the OA, the Examiner cites Liu as teaching a fiber optical gyroscope comprising a coil of single mode fiber (42), and first and second depolarizers (41, 43) one at each end of the fiber coil, and that the depolarizers
10 are attached to an integrated optical circuit (14) which includes a Y coupler and a polarizing waveguide (28).

With regard to claim 7, whose limitations have been added to the independent claims in the present application, the Examiner indicates (p. 5, last 2 pfs.) that Page does not disclose a specific length of the depolarizers.
15 Seemingly, Liu provides some length-based descriptions at 2/63 to 3/16. However, Applicants disagree with the Examiner's characterization that it would have been obvious to one of ordinary skill in the art at the time the invention was made to make the depolarizers of any length as to reduce the signal fading at the detector. What is not obvious with the independent claims, as amended, is the
20 length and arrangement of the fiber sections within the leg segments of the depolarizer. Liu teaches a contrary construction in 2/63 to 3/16 in which each of the depolarizers have the same structure, with the longer fiber section always

attached to the fiber loop (with the exception that in one depolarizer, the longer leg is twice the length of the longer leg in the other depolarizer).

Applicants respectfully assert that Liu fails to teach or suggest the element of claim 1 that the thermal and mechanical influences on the optical path lengths
5 of each one of the optical fiber sections are substantially the same, or that the two depolarizer segments are configured to maintain mechanical and/or thermal symmetry and suppress polarization errors using the depolarizer structure of the independent claims, as amended.

For these reasons, the Applicant asserts that the claim language clearly
10 distinguishes over the prior art, and respectfully request that the Examiner withdraw the §102(b) rejections from the present application.

35 U.S.C. §103(a), CLAIMS 5-7, 21 AND 22 OBVIOUSNESS OVER PAGE

*6. Applicants rely on the arguments presented above with respect to anticipation by Page in asserting that the present invention is not obvious in view
15 of Page, particularly with the claims, as amended.*

Applicants have argued above under numbered paragraph 2 that Page fails to teach or suggest that the thermal and mechanical influences on the optical path lengths of each one of the optical fiber sections are substantially the same, and for this reason, fails to obviate claim 1 of the present invention.
20 Furthermore, Applicants have argued above that Page does not teach or suggest the element of claim 11 that the depolarizer segments are configured to maintain mechanical and/or thermal symmetry and suppress polarization errors.

For these reasons, the Applicant asserts that the claim language clearly distinguishes over the prior art, and respectfully request that the Examiner withdraw the §103(a) rejection from the present application.

CONCLUSION

5 Inasmuch as each of the objections have been overcome by the above amendments and remarks, and all of the Examiner's suggestions and requirements have been satisfied, it is respectfully requested that the present application be reconsidered, the rejections be withdrawn and that a timely Notice of Allowance be issued in this case.

10 Respectfully submitted,

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